

## STAGES AND METHODS OF DEVELOPING DESIGN- GRAPHICS OF MOBILE GAME APPLICATIONS

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The work is devoted to the peculiarities of developing graphics for game applications. The article considers the historiography of the problem, analyzes the design process and types of games by genre, features of different graphic styles. Based on the research, the idea of a new game application using elements of Ukrainian mythology was proposed, requirements for its main functionality and appearance were formed, the concept of a mobile game application, its target audience was determined, the main characters, screens, playing field, background, screensavers were designed and other elements of the game.

**Keywords:** game design, game mobile application, technical development, game concept, Ukrainian mythology.

### Introduction.

It is hard to imagine the modern world without computer and mobile games – entertaining and educational. The active development of technologies allows us to offer consumers an increasingly attractive design, realistic graphics, and exciting plots. Therefore, it is not surprising that every year the number of consumers of computer and mobile games is constantly increasing. Due to the different target orientation of games, variety of genres and plots, computer and mobile games have gained popularity among different age categories and social groups. Game design development forecasts for 2022 promise a further expansion in this industry [1]. According to the reports of the analytical company Newzoo, the number of gamers on all platforms reaches 2.8 billion people (this is almost every third inhabitant of the planet).

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Until recently, the term “gamer” conjured up the image of a teenage boy in a zombie costume, chained to a sofa, with a remote control attached to his hand, and with eyes drawn to a computer or TV screen. Today, the term covers all consumers who simply play video games or are interested in learning about this culture. The number of mobile game users has increased significantly in 2020 due to the global pandemic.

Game design is part of the field of video game development and uses creativity and design to develop a game for entertainment or educational purposes. This design involves creating compelling stories, characters, rules, and challenges that facilitate interaction with other characters, users, or objects [1]. Each game consists of a number of different gameplay systems, mechanics, and features that all work together to create an engaging or educational experience for players, depending on the game’s purpose. At the core of most games and player experiences are the worlds, maps, and levels in which players interact.

According to the analysis of the aforementioned company Newzoo, one of the five popular genres of mobile games that will be popular in 2022 are puzzles and riddles. More than half of mobile users, according to the study, have at least one puzzle, and among female users – two or more. Variations of casual puzzle games, a sub-genre of “3-in-row”, installed on most people’s phones. These games cover a wide audience, hold a strong position in the market and bring a solid profit to their creators.

It is known that learning in a game form allows a person to absorb information faster and to be interested in the events presented to him. In addition, it is the design and graphics of the game that are often the most important factors in the success of the game among consumers. Even if the information presented in the game itself is not very interesting, the high level of its graphic design draws attention to itself and captures interest. Therefore, for example, combining the study of history with modern types of entertainment of the XXI century, such as multimedia and gaming, contributes to the spread of knowledge not only about facts, but also about folklore and folk customs.

### **Setting objectives.**

The increasing popularity of mobile games contributes to the constant expansion of their assortment, and technological development allows to

improve their graphic design. Therefore, it is relevant to investigate the process of designing mobile game applications, systematize them and develop a game design with an educational component based on Ukrainian mythology.

Tasks of the study:

- to investigate the genesis of game design, to analyze the modern process of developing mobile game applications;
- systematize mobile games by genres and game graphic design styles;
- determination of the main stages of game application development;
- form the concept of a mobile game design project based on Ukrainian folklore, determine the target audience of consumers, develop search sketches and create an actual design.

The object of research is the design and artistic arrangement of mobile game applications.

The subject of the research is artistic and compositional features of modern web illustration of mobile game applications.

### **Research results and their discussion.**

If we consider games as a global industry, we can note the rapid development of this market, the estimated value of which is more than 160 billion dollars in revenues in 2020. Most of this profit usually comes from the sale of mobile games, even not taking in account the computer design, which is considered the fastest growing sector. Due to such large revenue figures, game developers are interested in constantly creating new applications, using new ideas and “materials” [2].

The first mobile game was created in 1994 for the Hagenuk MT-2000 mobile phone. It was a version of the popular arcade game “Tetris”. This game was the beginning of what would later become a successful and profitable industry [3; 4]. Three years later, in December 1997, Nokia began installing the Snake game on its mobile phones. This game has gained great popularity, and its variations are installed on more than 350 million devices. It became a worldwide phenomenon due to its simple gameplay, interesting use of space and the fact that it was suitable for all ages. As the first handheld games with simple gameplay and short session lengths, Tetris and Snake are forerunners of the genre known today as “hyper-casual games” that are once again flooding app stores.

The peak of the creation of widespread games, many of which are still in demand today, was observed at the period from 1999 to 2005. An example of such games is “Space Invaders”. The culminating moment in the history of the development of mobile games was the launch of the N-Gage Phone in October 2003 by Nokia. This device combined phone functions with games. The N-Gage made it possible to play in many applications, even 3D, such as “Pro Skater Tony Hawk’s Pro”.

Another breakthrough in the market was the appearance of the iPhone in 2007. The introduction of smartphones has become an important achievement in the field of communication. These devices had better software and hardware features with each generation.

Gradually, developers are moving away from game consoles to the development of PC and mobile games. Mobile platforms have not the limitations of console development. They are much cheaper and can be developed without the help of a publisher. Also, with the introduction of Android and the iPhone, the quality of mobile game development started to catch up with console games.

With the advent of the App Store, a new era of mobile games has arrived. When the “store” was first launched, it offered only 500 games, the most famous of which were “Texas Hold’em” and “Super Monkey Ball”. A number of highly successful and extremely engaging mobile games (or iPhone games), including Angry Birds in 2009 (the first commercially successful mobile game), Plants vs. Zombies” in 2010, “Fruit Ninja” in 2010, “Cut the Rope” also in 2010, “Temple Run” in 2011, “Flappy Bird” in 2013, “2048” in 2014 and many others, were developed in the early 2010s. (Figbre A.5, appendix A). In 2012, one of the most popular mobile games in the world – “Candy Crush”, the legendary video game “3-in-row” – was introduced. It is able to hold attention for some time, while developing concentration, reaction and observation. In addition, the graphics of the game and the brightness of the colors do not leave anyone indifferent.

As the number of introduced releases continues to grow, many developers are using new technologies to stand out from the crowd. For example, Pokemon Go is a mobile application whose main task is to find the main characters in the real world and time using a simulator. That is, the game projects the image of a cartoon character due to the use of the camera of the device, in our case, the phone.

Currently, there are many different genres of mobile games available in app stores, with many different approaches to defining the mobile game taxonomy (in other words, grouping). The exceptional development of applications has led to the emergence of an audience that is not only based on gamers, but also includes ordinary consumers. A large part of “mobile” players belong to the target group that does not define itself as professionals, but belongs to the hyper-casual genre of mobile gaming.

There are more than 6 million applications for nowadays. This number includes: Google Play Store – 2.57 million apps, App Store app – 1.84 million apps, Windows window – 669,000 apps, as well as Amazon, which offered more than 489,000 apps in 2019 [5]. The rapid development of software stores is equivalent to the global growth of the popularity of mobile games in the market. Due to the constant quantitative growth of applications and their updates, most of the above are no longer in demand at the moment. Finding the right monetization strategy can often be a major obstacle to consumer adoption of a created game [6; 7]. Games can be downloaded from app stores such as Google play or the App Store, or they can be preloaded on the device by default You can also play your games from the cloud (virtual storage).

According to research [8], women mostly like logic games and passing levels, and only 30% of men are interested in such. At the same time, for men, the selection of levels of different complexity is a priority. The players could be relatively divided according to the degree of interest into casual (newbies), hardcore (pro-gamers) and mid-chord players (players who do not fit into the first two categories and play radically different games). Also, in the games there is a division of consumers according to the ability to pay – those who are ready to pay and those who are not. Such development of the gamer subculture requires the development of the game market. Covering this audience requires not only expanding strategies to a much wider population, but also creates more subgroups of consumers.

Well-known qualities of mobile applications [9; 10] are the right mix of fact and fantasy, focus on game graphics, sounds, story and replay value. The idea and even the graphics of the game depends on the category or genre to which the game will belong. Table 1 shows the characteristics of the main genres of video, computer and mobile games.

**Table 1 – Characteristics of different types of genres of video, computer and mobile games**

The name of the genre of the game	Characteristics of the genre	The most famous games of the genre
“Action” or “adventure shooters”	These games consist of several levels and in order to go to the next one, a player or a group of people must use any weapon to reach their goal. Both real characters and fictional monsters or mutants can act as antagonists.	“Angry Birds” “Machinarium”
Fighting games	Games where the user fights against opponents who may be armed or unarmed.	“Mortal Kombat”
Simulation games	These games offer realistic interpretations and operations of various machines or real actions, so they are widely used for various educational purposes. With the help of the device, physical behavior and control of something is simulated. The main criterion is the completeness and realism of the modeling of the object. Most games are a simplified version of technical simulations, often with alternative physics.	“Need for S speed”
Puzzles	In these games, to get what you want, you need to involve logic to establish patterns, find combinations, learn some rules.	“Tetris” “Candy Crush”
Educational games	These applications have an educational component and are very diverse. As a rule, these programs have simple graphics.	Various educational applications

**Characteristics of the video, computer and mobile game design process.**

A game designer is responsible for keeping the game’s core concept intact in all areas, including: level design, game mechanics, attractive design, and more. Despite the large number of genres, the design process of all video, computer and mobile games is the same and consists of the following stages: ideation, development of concept, development a proof of concept, creation of a game design document (GDD), prototype of the game, design architecture, support of game [11–13]. Each of these stages is discussed in detail below.

**1. Definition of the idea** is the first stage of project creation [14], and the game concept will be based on it. At this stage, it is necessary to determine main idea and goals of the game. The question of determining the target audience is one of the most important for the success of the game [15]. For this, you can use additional questions that will prompt you to solve the task, namely:

- determination of the target audience of players, their age groups;
- formulation of the main idea of the game, which should interest the player and incline him to choose this particular game;
- formulation of the idea that the developer wants to convey to the consumer with the help of the game;
- determination of whether this game is entertaining and fun, what parts of it should bring pleasure to the player;
- determination – what makes the game different from others (design, concept) and what can surprise players during the game.

The answers to the above questions are intended to help provide as accurate an idea of the game as possible and move to the next stage.

**2. Concept development** is the second stage. Toru Iwatani, the creator of the game “Pac-Man”, believes that whoever develops projects should aim to make people happy [16]. The concept of the game is a brief description of the main points of the creation of the project and its design [17–18]. The concept of the game should contain generalized information about the game, the reason and idea for creation. It also includes an analysis of all possible actions that are offered to the player. Concept development includes the following points: sketching, game mechanics, settings, technology, interaction.

*Sketching* is the development of the right image that will best convey the idea and atmosphere of the game, the features of the characters. For each element of the project, several sketch options are created, from which the most suitable option is selected. An important point that the designer must follow is to create all elements in the same style: all icons, internal blocks, characters, etc. must be similar in color, style and appearance.

*Game mechanics* are a set of rules that describe the steps a player takes to achieve game goals. For example, the mechanics of regular chess include a description of the board, a starting position, and a list of moves that each chessman can make. Of course, the game mechanics should also contain victory conditions.

*Settings* are about two things: history and aesthetics. The story describes the game world, the events that happened before, and the events that happen during the gameplay. Aesthetics is how a game looks and sounds. Both parts of the settings are closely related. Together, they are extremely important to the user experience. The story may not be developed for some abstract games, or an already known backstory may be used, for example, the plot of some movie.

The main problem that every game designer faces is the individual screen diagonal of the device. They have different proportions and different standards on different platforms. It is for such cases that the basic permissions of the devices used as a prototype exist. For iOS users it is 375/667, for Android owners – 360/640. Further corrections are already taking place on the device itself. Exceptions are also possible, and in order to create games for these devices, all content must be drawn specifically for its dimensions [19].

*Technology.* The technical requirements depend on the devices for the game. Which tool the designer will use depends on what can be technically implemented. For example, mobile games designed for a tablet or a powerful smartphone can afford a rather demanding design. Choosing a technology is a delicate balance between having easy-to-write, maintainable code and sufficient performance on the target devices.

*Interaction* involves coordinating the mechanisms of user interaction with the game, the developers' use of the device's advantages and the choice of input methods, the use of screen space. This part is extremely important for mobile devices, which may differ in appearance.

**3. Developing a proof of concept** consists of testing the feasibility of critical game functions, selected control methods, and immersive gameplay. It is also important to ensure that the team's artists are able to create a design and style that will appeal to the target audience.

**4. Creating a Game Design Document (GDD).** A game design document is a very detailed definition of the project itself. The GDD is a "living" document, so it can be changed during development and feedback. Whenever the requirements change, it needs to change as well. Typically, GDDs are created and edited together with developers and designers and are used to organize team efforts. Unlike a high-level concept document, a GDD includes the main implementation details [20–21]. In addition to



describing the game, the GDD should also describe the player. Games aimed at too broad an audience often have lack distinctive features and can seem too primitive and not attractive enough for everyone.

**5. Creation of prototypes.** This stage assumes that most of the mechanics have already been tested. This allows you to create a reproducible prototype for the target platform. It should include most of the important mechanics and remind important parts of the game. In other words, this is a simplified version of the program for trial use. Due to the fact that the entire process of creating a game and designing for it takes a long period of time, any mistake, even a small one, will cost many hours of work. That's what prototyping is for, to identify problems early on and fix them.

**6. Design architecture.** Most of the game features and scenarios are already in progress in the first stage of development. Scarcely, any game in the world looks and programs the way it was originally described in GDD. New ideas emerge, technology and the project itself change. That is, the project constantly has a changing nature of development and requires very flexible architectural solutions based on a modular approach. Creating this kind of architectural design can be a daunting task, but it is the most important step in the game design process. A mediocre development team will have no problem joining an additional team if a great architectural solution already exists and is presented to them, but even the best will struggle with a poor architecture structure.

**7. Game support.** For most mobile and web projects, the release is just the beginning of a long, arduous road. For the constant growth of the user base and a high level of retention on the first lines of web stores, updating the game is a critical important and constant process! Analysis of current hit games suggests that updates should be released every two to five weeks. At the same time, each update should add more content to the game. On the example of applications that came to us from zero years, you can see the contrast even at the time of designing graphics. Game design has always kept up with the times, so the artists who take part in it have always been and will always be on trend and will never be without work.

When developing a game design, there are usually a large number of screens occur. In order not to lose the idea, you should create a navigation map of the application [22]. It can be both a complete description of the project and a partial one, divided into separate blocks. A screen map can be created

both at the initial stage and at the design stage. This navigation is created to build the logic of the application. The map helps to identify missing screens that the developer may have forgotten about. It can be created using special applications, such as Figma or Sketch, or drawn by hand.

### A study of the design style of game applications

Game art is a complex field, which on the one hand shows the embodiment of fantasy and creativity, and on the other – a set of functions. A concept art designer deals with the creation of characters, weapons, interface and style of the game. The latter occupies a special place in the world of video games. Today, the following styles of game design are distinguished: casual, stylization, realism, author’s stylization (Table 2).

The choice of game design style depends on the following factors: audience perception, “lore” (game story), genre and technical requirements. Examples of the application of these styles and their varieties in game design are given in Figures 1-3. Each genre has its canons of design and its consumers. The main question when working with this point is: “What kind of audience do we want to attract?”. The next important point is the compatibility of the graphics with the story of the game. That is, if the plot of the game is fantastic, then it will be difficult to implement it using minimalist graphics.

The appearance of the game largely depends on what mechanics are used in it. Taking into account all three factors, it is necessary to find a “golden mean” that would meet all the parameters of the project being developed.

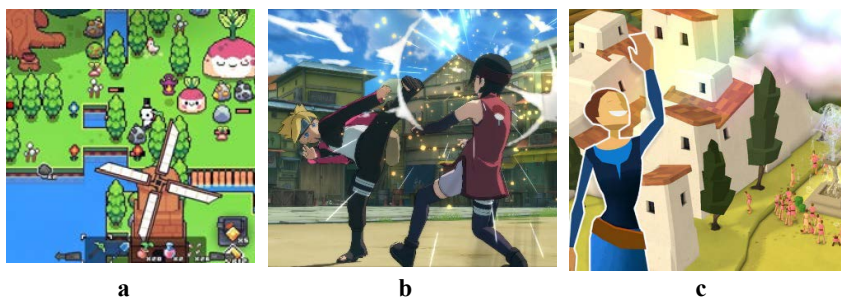
When researching web design products presenting on the domestic market, a significant advantage of the influence of the traditions of Western culture is observed. This is due to the later introduction of Internet providers



Figure 1 – Using a casual style in game design:  
a – childish; b – female; c – male

**Table 2 – Variety of graphic design styles for video, computer and mobile games**

The name of the graphic design style	Characteristics of style	Subspecies of style	Example
Casual	The style is easy to understand, the character design is similar to the design used in many cartoons.	– children’s	simple bright graphics with familiar images
		– female	a fantasy theme using a palette close to purple
		– male	simple graphics with simplified shapes and bright colors, and complex gameplay
Stylization	The design of the game involves a stylized presentation of heroes and other elements of the game	– pixel art	is used for classic pixel games, which are distinguished by a developed and improved visual world
		– comics, anime	the color palette does not differ from the traditional design, it is close to women’s casual style
		– low-poly	modern direction, the characters are assembled from geometric shapes
Realism	The design of game elements and heroes is characterized by high detail and a low degree of stylization, changes in proportions	– fantastic	use of bright colors and not fully realistic graphics, but with correct proportions; the world as we see it, but with elements of fiction
		– contemporary	the real environmental world
		– historical	the plot and design are based on real or altered history
		– dark	gloomy setting with muted colors (post-apocalypse world)
Author’s stylization	Other types of stylization in game design, which helps to stand out from the competition		



**Figure 2 – Stylization in game design:  
a – pixel art; b – comics/anime; c – low-poly**

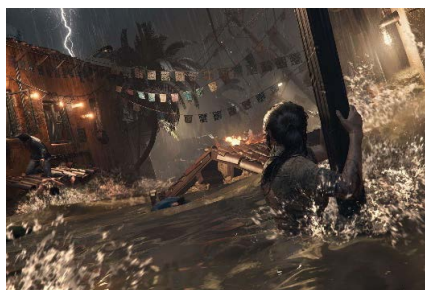
in Ukraine, as well as the lack of good computers and high-quality Internet until the early 2000s. Tim Burnes Lee first created the site in 1991, and web design in Ukraine began to actively develop only in 1999 [21]. In addition to such simple technical problems, there was another important problem – the conservatism of the thinking of many compatriots regarding design in general, which blocked the progress of ideas.

When it comes to developing a game that will appeal to a large audience, it's not enough to just make entertaining content, it's important to create an atmosphere that is interesting to everyone. As mentioned earlier, the most popular games are variations of the game “three in a row”. This is an excellent option for players of any age, which opens up an opportunity to present information in an interesting way.

For example, the content of the game “Candy Crush”, which is a vivid representative of the “three in a row” games, consists in solving puzzles with the help of tasty candies. The game has been downloaded more than half a billion times, the age of its audience is from 8 to 80 years. That is why the developers pay special attention to the design of each level, each character, and constantly add various updates. All of the Candy Crush characters are fun, colorful, and have a little quiriness. These are easy to draw different types of creatures that have an aesthetic look in the style of the animation studio Hanna-Barbera. The game has 380 levels, each of which has an attractive appearance and keeps a balance between challenging and achievable. The game developers believe that any idea that is fun and non-offensive can be used in the game. Each new game should provide the player with new



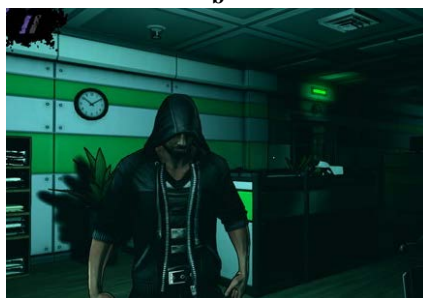
a



b



c



d

**Figure 3 – Using the realism style in game design:  
a – historical; b – contemporary; c – fantastic; d – “dark”**

experiences. The popularity and success of the game is confirmed by the fact that in 10 years three sequels were released: “Candy Crush Jelly Saga”, “Candy Crush Soda Saga” and “Candy Crush Friends Saga”.

Fashion trends change, people often become interested in things from the past. There are about three thousand different peoples and nations in the world, each of which has its own unique culture and view of the world. Each nation has its own traditional costumes, dishes, architecture, and special household items. That is why the culture and traditions of different peoples are an inexhaustible source of inspiration for designers. Thanks to the design, the most ordinary things can turn into translators of the history of their nation, its culture and traditions, broadcast its clearly expressed attributes to the. If we talk about Ukrainian web design in particular, it can be said that it also has a national flavor. What was created for Ukrainians should be Ukrainian.

The main idea of the “Spirits of the Forest” project (author student R.R. Karagozyan, supervisor Ye.O. Holovchanska) was the popularization of Ukrainian mythology. Folklore and mythology of Ukraine are diverse and rich, filled with various interesting and unique stories and heroes. Ukrainian symbols, costumes, mythical creatures, omens, even nature – became the inspiration for the development of the design of the mobile application. To create the application, myths and legends that have reached our days, available information about famous mythical creatures were analyzed [23; 24].

Various mythical creatures take an active place in Ukrainian folklore – Mavka (Dreads), Mermaids, Lisovyk (Forestman), “the one who sits in the rock” and many others. Our ancestors believed that spirits exist in everything that surrounds them. And that is why they were distinguished into spirits of the forest, water, air, earth, household spirits and others. Today, humanity’s attention is focused on the environmental problems of the planet, among which one of the most important is the preservation of forests and green spaces. Therefore, the game, which tells about the spirits of the forest, is relevant and will contribute to the support of measures aimed at preserving forests.

The game has an informative part and is intended for a more mature audience. The target audience is women aged 20 to 50. By their interest for the consumers, the games are midcores, who prefer games with a design in the style of women’s casual. This group of users will appreciate the detail and beautiful presentation of the game. To attract the attention of as many people as possible, the development combined two important factors: image quality and an interesting game scheme.

The idea of developing this game application is the thesis that ethno-history can be interesting and should be known. Even if the information itself will not be important to the player, due to the constant motivation inherent in this genre, sooner or later he will begin to perceive it, and may even learn it on his own. The application is designed for a Ukrainian audience, but even a foreigner can find a lot of interesting things in it.

According to the idea, the player is provided with information about the main characters, mythological forest creatures, in a light game form. The symbiosis of graphics and successful, interesting text is a characteristic feature of this project. The main feature of the game is the fairy-tale atmosphere of the application. Literally every element that makes up the application is worked out to the smallest detail, taking into account the

given topic. All costumes, symbols, choice of colors – everything has a vivid meaning. The effect of immersion in the “fictional” world is achieved with the help of graphics, appropriate music and sounds. Level and map locations were created based on Ukrainian landscapes using deep colors and glow to convey a sense of enchantment.

**Description of game mechanics.** As mentioned earlier, this project was created on the example of Candy Crush, so its genre is identical – a puzzle. To win the game, you need to use logic to establish patterns, find combinations, and learn some rules.

The action for the selected project is quite simple – collect in a row (horizontal or vertical) at least three identical elements, in our case – stones. For creating combinations, the player receives points, and for the completed task, he is allowed to move to a higher level. Depending on the number of collected elements in a row, bonuses are given in the form of additional weapons. According to the passing of the levels, the locations change – the further, the more difficult. If the player reaches a dead end and does not have a solution to the task offered to him, he receives a little help:

- the use of additional “weapons” (additionally to those that can be independently obtained inside the playing field), and which are replenished daily to facilitate the game;

- a hint if the player does not make a move for a long time – a small movement of the desired element to obtain a combination;

- mixing all elements within the playing field in the absence of possible moves to continue the game;

- the ability to restart the level, thereby making a new layout of the playing field.

**Description of the game.** The game application “Forest Spirits” is based on Ukrainian myths about creatures living in forests. The player is presented in the plot as a traveler who goes through detours and paths and meets the Forestman – the master of the forest and the main character of the plot after the player. The Lisovyk will be the companion of player, will introduce him to other spirits and will discover to player his knowledge.

The first few levels are introductory to help the player understand the rules and get comfortable. With each new passage, the difficulty of the levels gradually increases. At the end of the level, the player receives a pleasant bonus – a little information about the forest spirits with whom the



traveler managed to meet. Information is presented gradually so that the interest in learning does not disappear. As a result, in order to go further, the traveler needs to solve a task of a more difficult nature in the last level of the chapter, and only then the forest spirit, with whom he was introduced, lets the player go.

The basis of the playing field is magical pebbles with Ukrainian symbols, which also carry meaning. Scattering them, the traveler must make the right combinations to go further. There is no time limit for solving the task, only for making decisions – the number of moves is limited. If the allowed moves run out, the player loses a life. The game is stopped for the time when the indicators will be zero. But after some time “life” is replenished again (for example, every 20 minutes – 1 life). The game is completely free, so you can replenish the number of attempts only thanks to time. At the end of the level, depending on the number of moves used, the player is awarded a certain amount of gold coins, which he can then use to buy additional weapons (the fewer moves used, the more money received).

The chosen atmosphere and the main characters need appropriate music with folk motifs. The game uses background music with words at the stage of choosing a level on the map, and during the completion of tasks – a melody without words, so that it is pleasant to play and the person is not distracted by unnecessary stimuli. It is also possible to voice the information that comes after passing the level in Ukrainian. This feature can be adjusted by the player using a setting. In addition, the game can be played offline, which means free access anytime and anywhere. This is an excellent option for long trips or places with unstable network connection.

The design of the Forest Spirits app, character images and additional elements were created using Procreate, a digital illustration application. 3D graphics were chosen for the project because it better conveys the idea and fairy-tale atmosphere. Accordingly, all elements that will be present on the screen have a volume and a shadow. The main feature of the selected graphics is the glow of: the playing field, amplification, butterflies and stars, levels, etc.

Each level of the game is supported by its own story and carries its own meaning. Before starting to create sketches, a suitable palette was first selected, combined from various arts related to the night miracle. This palette served as inspiration for creating the own style.



***Game application characters.*** The search for the right stylization and the right image began with the selection of characters. There are quite a lot of forest spirits in Ukrainian mythology, so it was necessary to choose from them those who most correspond to the plot of the game. As the main characters were chosen Lisovyk (Forestman), Mavka (Dread), Poliovyk (Fieldman) and Chugaister (one of the night forest spirits). In addition to conveying the nature of the character, it was necessary to demonstrate variations of costumes with Ukrainian motifs.

To create a bright look of the characters and convey their character, it was decided to make eyes without pupils. Swallows (freckles) became another integral part of the image of each character. The white eyelashes and eyebrows of the main character also contributed to this. To add more “cartoonishness” to the picture, each of the heroes has blush and glare added in the area of the ears and nose. Thus, examples of special heroes were created, the image of which causes an association with getting into a fairy tale. The general stylistic feature of all characters in the game has become: a rounded head with pronounced cheeks; certain tinnitus; pronounced eyes and the image of the symbol on the face. Blush was also used when painting the hands and feet. The hair of the characters is processed in several layers. Each hero – character was created according to this scheme.

The main character of the game is the Lisovyk – the owner of the forest, who lives among thick trees or in a dry hollow. According to the game scenario, the Lisovyk guides the player through different levels of the game until it ends. In the legends, Lisovyk is described as a short old grandfather with a long gray beard, in a massive sheepskin coat with a stick in his hand; on the top of stick bells are attached. In many images, the Lisovyk has tree branches or deer antlers on his head. He is considered a spirit that is kind to people (Figure 4).

When creating the image of Lisovyk, special attention was paid to the drawing of the hero’s head. In this image, all the characteristic features of the Lisovyk were combined and supplemented with ears of a slightly elongated shape with fur at the end. Lisovyk’s nose is large, “potato-look”, like nose of stereotypical old grandfather. His eyes are medium-sized, emerald in color, above which are thick eyebrows. There are many wrinkles on the face, and the forehead is gradually covered with fur. To create the hero, muted colors were mainly used, but at the same time it was possible to convey his features and in general to make the image bright (Figure 5).

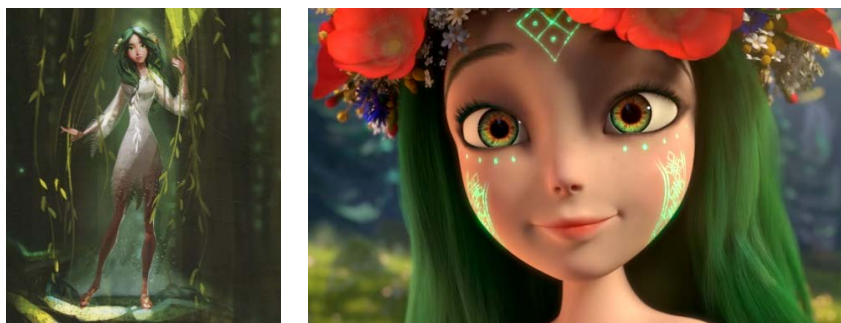


Figure 4 – Prototypes of the image of Lisovyk [25]

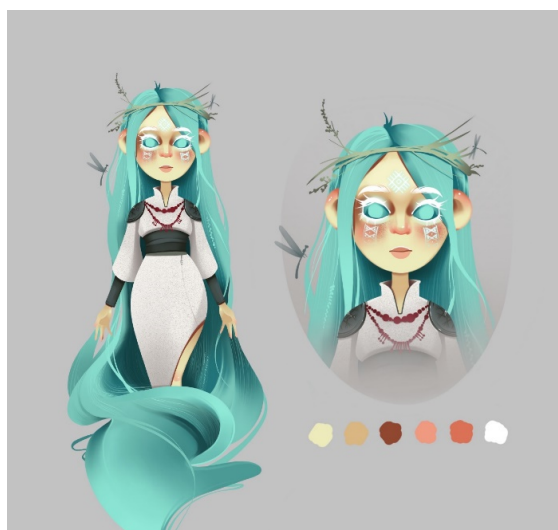


Figure 5 – Finished layout of the image of Lisovyk, author's design

The next hero of the game is Mavka – a female character who lives in forests, fields, tall grass, but not in water, like mermaids. According to legends, Mavkas have long luxurious hair decorated with various flowers (Figure 6). As the myths tell, with the beginning of spring, Mavkas plant gaps with flowers in the evening, swing on trees, sing and dance. Where they pass, the grass becomes thicker and greener. In this game application, the image of Mavka is represented by a young girl with beautiful long greenish-blue hair, with a graceful figure. She is dressed in a monochrome long dress with a massive dark green belt and shoulder pads, with a bright red necklace around her neck (Figure 7). Additional attributes of Mavka's



**Figure 6 – Prototypes of the image of Mavka – the heroine of the cartoon “Mavka. Forest Song” [26]**



**Figure 7 – Ready image of Mavka, author’s development**

image are dragonflies, which strengthen the associative connection with nature, flowers and add liveliness to the image.

Another hero of the game is Chugaister or Man of forest. He is usually mentioned in the mythology of the Ukrainian Carpathians. This forest spirit has a cheerful disposition and loves to dance and sing. Chugaister was

considered a good spirit that helps people. Sometimes he was depicted in the form of the wind, and more often – in the form of a giant naked hairy grandfather (similar to a snowman) who strictly roams the forest (Figure 8).

It was this image that was taken as a basis when creating the image of the hero of the game. The upper part of his body somewhat resembles a monkey due to his large round ears, huge clear blue eyes, bald head. His beard goes down to the bottom of his belly, and his head is decorated with a wreath of tree branches. Chugaister's cheerful character is reflected in expression of his face. To add contrast to the image, pictures of red sprouts were added



a



b



c

**Figure 8 – Prototypes of Chugaister's image:**  
a [27], b [28], c – painting “Chugaister – Spirit of the Carpathians”,  
artist V. Bartenev, 2004 [29]

to the character's shoulder. Chugaister was never shown clothed, but to complete the overall picture a wide, bright red belt was added to his hips with embroidery at the bottom. Another element that characterizes it and highlighted his connection with nature are the birds around (Figure 9).

The last hero of this game is Poliovyk (Fieldman) – the spirit of the fields. According to the plan, after the Forestman takes the player out of the forest, he will be met by the Fieldman and then the story will continue with him. This character was brought in for possible further development of the game app and updates about other mythical creatures. The desire to bring everything to the end will force the player, starting the story with the spirit of the forest, to continue it with the spirit of the fields.

According to legends, Poliovyk is a humanoid creature with pronounced animal features (Figure 10). It is believed that Polovyk guarded the field and had an influence on its fertility. The color scheme of his image reflected the warmth of the sun and wheat. He has the appearance of a hard-working peasant: a simple shirt, torn short pants, a bright red vest. The nature of the character is conveyed with the help of yellow-burnt hair, into which ears of corn are woven in places, warm eyes the color of wheat, ears that look like the ears of domestic cattle (Figure 11).



**Figure 9 – Final layout of Chugaister, author's development**



Figure 10 – Prototypes of Poliovyk's image [30]

The initial concept of the image of the characters was also supplemented with special symbols that glow on their faces. These symbols should emphasize the character of the heroes. That is why Mavka has a glowing symbol of youth on her forehead, her head is decorated with a wreath with a flowers, Lisovik has a “tree of life” sign on her cheeks, Chugaister has a “fern flower” on his forehead, and a “ploughed field” symbol has a Poliovyk.



Figure 11 – The final layout of Poliovyk, author's development



Another important visual part of the game is the game stones. Due to the fact that the game “three in a row” has its approved canons, the key elements can be of different colors, different shapes or depict different objects. Before drawing, all possible options were worked out: using crystals, stones of the same shape and different colors or different shapes and different colors. To make them unique, an image of some symbol was planned on top of the stones. After that, the color palette was selected. Each option was carefully drawn (Figure 12), and the last one is taken as a basis. The red stone marked skill, the blue one – a star, the green one – wisdom, the orange one – vitality, the emerald one – a hero. At the moment when the player opens for first time the first level, he is given the meaning of each sign as a separate piece of information.

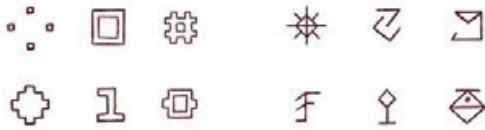
By design, the image of the background pictures was used in the form of slides – pictures with slowly transition from one to another. The prototypes for the background became Ukrainian landscapes. All pictures are connected by a bright emerald river which runs across the map and connects all parts of the game. Additional elements (life and coin indicators) and blocks (images of paper on which information is provided and additional blocks in the form of stones), information grid structure, download page, game field, application icon were also developed (Figure 13).

### **Conclusions.**

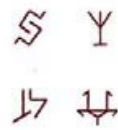
As a result of the study, it was established that the market of mobile game applications is constantly expanding, including at the expense of new categories of game consumers. The entire range of modern mobile games has many genres, the main ones are: “action” or “shooting adventure”, fighting games, simulation games, puzzles, educational games. Within each genre, there is an additional division of games into subgenres depending on the features of the plot, game mechanics, and target audience of consumers. It has been determined that mobile game applications of logical games with a three-dimensional visual style and simple mechanics based on the well-known game “Candy Crush” from the puzzle genre, namely “three in a row”, are very popular.

Types of graphic design styles (casual, stylization, realism, author’s stylization) of computer and mobile games, as well as their subtypes, are

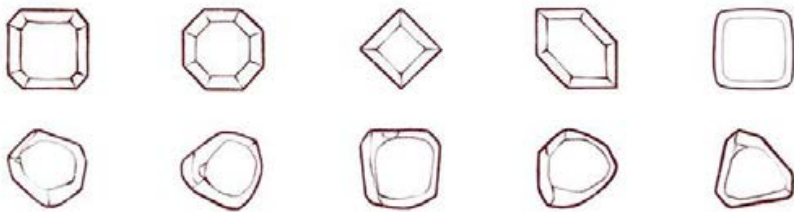
Варіанти звичайних значків



Значки посилення



Варіанти камінчиків



Варіанти посилення



Figure 12 – Step-by-step development of game elements: game stones and signs for the game, author’s development



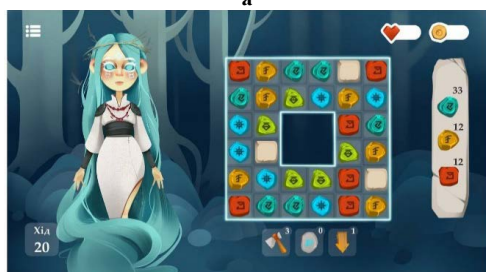


a



Духи Лісу

b



c



d

**Figure 13 – Examples of screens of the “Forest Spirits” mobile game application: a – download page design; b – game application icon, author’s development; c – an example of a page design with a playing field; d – an example of the information block of the game**

systematized. It was determined that the main factors affecting the choice of mobile game design style include audience perception (children’s, women’s, men’s), “lore” (game history), genre and technical requirements for the game.

As a result of the conducted research, 7 stages of the process of creating mobile game applications were determined. It was established that the creation of graphics design, which takes into account both the preferences of the target audience and the technical capabilities of ensuring the transfer of the character of the heroes and the atmosphere of the game, is important for the success of the game. The main styles of graphic design and their subtypes were systematized, and their characteristics were provided.

On the basis of the conducted research, the idea of a mobile game application “Forest Spirits” with an informational part for a female audience is proposed. The original plot of the game, author’s graphic design of character images, game icons and download page, background images, playing field, information pages, additional game elements were developed. The developed graphic design of all elements of the game is made in a single style, conveys the atmosphere of a magical forest, fully corresponds to the plot of the game, the peculiarities of the perception of the female audience of players, and technical requirements for contemporary devices.

### References:

1. Sait netology.ru. “Gejmdizajner – jeto vseгда gejmer”: chem zanimaetsja specialist, kakie navyki vazhny [A game designer is always a gamer: what does a specialist do, what skills are important]. Available at: <https://netology.ru/blog/04-2020-gamedesigner-chto-delaet-navyki> (accessed 20 August 2022). (in Russian)
2. Semenчук V. (2017) *Mobil'noe prilozhenie kak instrument biznesa* [Mobile application as a business tool]. Al'pina Pablisher. (in Russian)
3. Klemetti K., Grenberg H. (2020) *Mastera gejmdizajna: kak sozdavalis' Angry Birds, Max Payne i drugie igry-bestsellery* [Game design masters: how Angry Birds, Max Payne and other best-selling games were created]. Al'pina Pablisher. (in Russian)
4. Podshibjakin A. (2020) *Vremja igr! Otechestvennaja igrovaja industrija v licah i mechtah: ot Parkan do World of Tanks* [Game time! The domestic game industry in faces and dreams: from Parkan to World of Tanks]. Fors. (in Russian)
5. Sait statista.com. Number of available applications in the Google Play Store from December 2009 to March 2022. Available at: <https://www.statista.com/statistics/266210/number-of-available-applications-in-the-google-play-store/> (accessed 20 August 2022).
6. Sait mmmr.ua. Zhenshhiny predpochitajut mobil'nye igry i golovolomki. Issledovanie [Women prefer mobile games and puzzles. Research]. Available at: <https://mmr.ua/show/zhenshhiny-predpochitayut-mobilnye-igry-i-golovolomki-issledovanie> (accessed 20 August 2022). (in Russian)
7. Griffiths P. D. (2016) *Head First. Programirovanie dlja Android* [Head First. Android programming]. Sankt-Peterburg: Piter. (in Russian)
8. Gjelloufej S. (2020) *Bol'shaja chetverka. Sekrety uspeha Amazon, Apple, Facebook i Google* [Success Secrets of Amazon, Apple, Facebook and Google]. Mann, Ivanov i Ferber. (in Russian)
9. Rogers S. (2014) *Level Up! The Guide to Great Video Game Design*. John Wiley and Sons, Ltd.
10. Shell Dzh. (2019) *Heimdyzain. Yak stvoryty hru, v yaku budut hraty vsi* [How to create a game that everyone will play]. Alpina Pablisher. (in Ukrainian)
11. Tekinbas K. S., Zimmerman E. (2005) *The Game Design Reader: A Rules of Play Anthology*. The MIT Press.

12. Koster R. (2018) *Teorija razrabotki igr i razvlechenij* [Game and Entertainment Development Theory]. DMK-Press. (in Russian)
13. Bond Dzh. G. (2019) *Unity i C#. Gejmdev ot idei do realizacii* [Unity and C#. Gamedev from idea to implementation]. Piter Press. (in Russian)
14. Heller S., Vien V. (2016) *Idei, kotorye menjali graficheskij dizajn* [Ideas that changed the graphic design]. BOMBORA. (in Russian)
15. Sait Harb. *Dlja kogo jeta igrushka ili kak opredelit' celevuju auditoriju* [Who is this toy for, or how to determine the target audience?]. Available at: <https://habr.com/ru/post/253895/> (accessed 20 August 2022). (in Russian)
16. Sait Harb. *Istorija sozdaniya Pac-Man* [The history of the creation of Pac-Man.]. Available at: <https://habr.com/ru/company/ruvds/blog/430648/> (accessed 20 August 2022). (in Russian)
17. Sait Harb. *Sozdanie koncepcii mobil'noj 2p igrы* [Creation of the concept of a mobile f2p game]. Available at: <https://habr.com/ru/post/276923/> (accessed 20 August 2022). (in Russian)
18. Adams E. (2010) *Fundamentals of Game Design*, 2nd Edition. New Riders Pub.
19. Sait DTF. *Karta jekranov v razrabotke igrovogo interfejsa* [Screen map in the development of the game interface]. Available at: <https://ddf.ru/gamedev/18185-karta-ekranov-v-razrabotke-igrovogo-interfejsa> (accessed 20 August 2022). (in Russian)
20. Rollingz Je., Morris D. (2005) *Proektirovanie i arhitektura igr* [Design and architecture of games]. Vil'jams. (in Russian)
21. Gregori Dzh. (2021) *Igrovoj dvizhok. Programmirovanie i vnutrennee ustrojstvo* [Game engine. Programming and internal arrangement]. Piter Press. (in Russian)
22. Horst M. (2017) *Sostavlenie mental'nyh kart. Metod generacii i strukturirovanija idej* [Compilation of mental maps. Method for generating and structuring ideas]. Omega-L. (in Russian)
23. Rusnak I. (2012) *Ukrainskyi folklor* [Ukrainian folklore]. Akademiia. (in Ukrainian)
24. Kononenko O. (2017) *Ukrainska mifolohiia. Bozhestva i dukhy* [Ukrainian mythology. Deities and spirits]. Folio. (in Ukrainian)
25. Sait About Ukraine. Available at: <http://about-ukraine.com/lisovik/> (accessed 20 August 2022). (in Ukrainian)
26. Sait Mavka.ua. Available at: <https://mavka.ua/uk/lynxhome> (accessed 20 August 2022). (in Ukrainian)
27. Sait Osvitoria.media. Available at: <https://osvitoria.media/news/uvydavnytstvi-knygolav-z-yavyvsya-atlas-monstriv-i-pryvvydiv/chugajster/> (accessed 20 August 2022). (in Ukrainian)
28. Sait Wikipedia. Chugayster. Available at: <https://uk.wikipedia.org/wiki/%D0%A7%D1%83%D0%B3%D0%B0%D0%B9%D1%81%D1%82%D0%B5%D1%80> (accessed 20 August 2022). (in Ukrainian)
29. Sait jag.in.ua. Chugayster Available at: <https://jag.in.ua/artworks/paintings/Modern-Chugayster-Spirit-of-the-Car/> (accessed 20 August 2022). (in Ukrainian)
30. Sait Wikipedia. Polovyk. Available at: <https://uk.wikipedia.org/wiki/Польовик> (accessed 20 August 2022). (in Ukrainian)